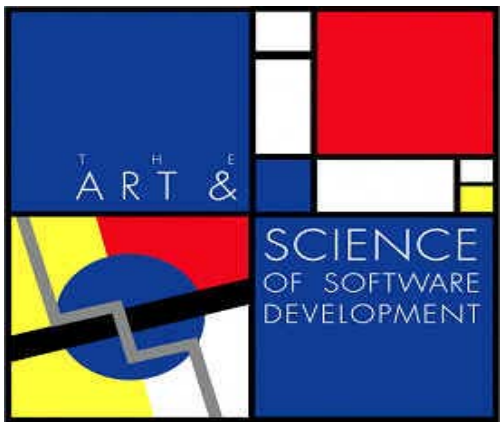
Innovative Partnership Program

Success Story

Automated Learning for Real-Time Expert System in Monitoring and Control

Description of Innovation

Interface & Control Systems, Inc. (ICS) of Melbourne, Florida, was founded in 1988 as a product development and engineering services firm specializing in real-time, embedded and autonomous command and control software systems. ICS was awarded an STTR through NASA (KSC) to develop a system that would automate the detection of mechanical failures in the Marrotta fuel control valves used in the space shuttle main engines. This 2002 STTR combines two cross-cutting technologies: Florida Institute of Technology's (FIT) Adaptive Machine Learning algorithms (AML) and ICS's SCL, a Rule-Based Expert System.



Value Back to NASA

The use of Adaptive Machine Learning (AML) techniques has proven that NASA can populate the SCL Rule-Based Expert System with monitor and control rules for a Space Shuttle Main Engine data stream. This approach keeps the human in the loop but removes mundane tasks, and allows analysis in real-time, post-test, and post-flight.

Commercial Benefits

Partnering with leading researchers in the field of data mining (Dr. Philip Chan and Dr. Matt Mahoney of Florida Tech) ICS developed a time-series data mining tool called sensorMiner. The sensorMiner toolset is a commercially available product that learns and generalizes current traces, formulates a concise model of the know good data signatures, applies the generated model to on-line, real-time data, detects on line (real-time) anomalies and/or deviations from the model and reports anomalies to the operator with explicit information as to where the signal deviated and exactly what constraints were violated. ICS hopes to penetrate existing Control System and Test Set markets that require more sophisticated real-time anomaly detection and analysis.

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Partnership Contributions

Interface & Control System's mission is to provide the essential products and services necessary to support intelligent, automated, mission-critical applications in the Aerospace, Intelligence, and e-Commerce industries. ICS has provided Systems Engineering, Development and Fielding of large scale systems. ICS also provides product, training, and engineering services to a wide variety of customers like Lockheed Martin, The Aerospace Corporation, Ball Aerospace, Johns Hopkins University and Applied Physics Lab, Naval Research Laboratory, Aerojet, GE-Harris and the Army. These companies have relied on SCL as the core component of mission critical systems that include: Control Centers, Embedded (flight and ground), Test Sets and GSE, Tactical Intelligence, Fault Detection and Recovery, Simulations, e-Commerce

IPP Role

Jim Van Gaasbeck and Brian Buckley, founders of Interface & Control Systems of Indialantic, applied for and was awarded a Phase II STTR contract through Kennedy Space Center's SBIR/STTR Program to address the need for a system that would automate the detection of mechanical failures in the Marrotta fuel control valves used in the space shuttle main engines. These programs are managed by NASA's Chuck Griffin and supported by ASRC Aerospace's Project Specialist, Jennifer Van Pelt.

Other References, Sources

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